

23. 27. The colloidal suspension of claim 13 wherein said colloid has an average crystal or agglomerate size of about 25 to 90 nm.

REMARKS

Applicant has amended the specification to better conform to U.S. practice by including appropriate descriptive headings and also a summary of the drawings as referred to in the Examples.

Applicant has also amended objected to but otherwise allowable claim 13 to make it an independent claim and also added new claims 21-27 which depend on claim 13. Thus it is believed that claims 13 and 21-27 ought to now be allowable.

Applicant has cancelled previous claim 4 and rewritten the claim as new claim 18. Also, new claim 19 recites that the crystallization temperature is about 90°C or less. Dependent claims 20 recites that the crystallization temperature ranges from about 50 to 90°C. Support for these ranges may be found in the Examples, e.g., Example 2 uses a crystallization temperature of 90°C (page 14, line 18) and Example 1 shows an embodiment where the crystallization temperature is 50°C (page 12, line 6). Other examples show crystallization temperatures within the 50-90°C range, e.g., 80°C, 60°C, 85°C, 67.°C and 70°C.

An aspect of the invention is that uniform crystals of very low average particle size may be obtained when the crystallization process is conducted at temperatures lower than crystallization temperatures normally used to crystallize zeolite. Note page 9, lines 8-10. The size/temperature relationship is shown in Fig. 2 and Fig. 3. Example 3 shows that crystals formed at 99°C were of 200-400 nm particle size whereas similar crystals formed at 85°C were of about 90 nm size. Also, Example 1 shows that crystals formed at 80°C and 50°C are of smaller and more uniform size than

crystals formed at 120°C. Note Figs. 2 and 3.

Thus, Applicant has amended most of the process claims to specifically recite the preferred crystallization temperatures at which the advantages of the present invention are obtained.

Applicant has also included new process claim 21 as well as product claims 17 and 27 which specify a range of molecular sieve or colloid average size of about 25 to 90 nm. Support for this range is also found in the examples. Example 1 at page 12, line 24 shows a crystal size of about 25 nm and Example 3 at page 17, line 10 shows a crystal size of about 90 nm. Other examples show crystal sizes within this range.

Claims 1-5, 7, 10 and 12 stand rejected under 35 U.S.C. 102(b) as anticipated by Calvert et al. (U.S. Patent 4,642,226). This grounds for rejection is respectfully traversed.

Calvert discloses the preparation of zeolite beta by forming a synthesis mixture containing a silica source, a dibenzyltrimethylammonium halide or hydroxide, sodium hydroxide and an aluminum source and crystallizing the mixture at an elevated temperature.

This reference does not teach molecular sieves having the crystal size dimensions as set forth in product claim 1 and claims dependent thereon. Recognizing this, the Examiner asserts that the product of '226 must be inherently as defined by instant claim 1 since the same process is used to make such product as is used in the present invention.

But this is not so. First, the '226 reference does not teach that the source of silica used, e.g., colloidal silica, is solubilized in the synthesis mixture prior to crystallization. In fact, patentee describes the synthesis solution as a gel. Dissolution of

the silica source prior to crystallization is a distinguishing feature of the claimed invention.

Secondly, the '226 reference conducts the crystallization in all examples at temperatures of at least 98°C. Applicant has shown in Example 3 of the specification that zeolite beta prepared at a crystallization temperature of 99°C produced spherical crystallites having a size between 200 and 400 nm, outside the scope of the instant claims. When a similar zeolite beta was crystallized at 85°C, crystals having an average crystal size of about 90 nm were obtained (note pages 16 and 17 of the specification).

Calvert et al. do suggest on col. 2, line 19 that the reaction temperature may generally range from about 80°C to about 175°C, but also state that a preferred reaction temperature range is 100°C to 160°C (col. 2, lines 22 and 23). This is certainly not a teaching which would direct one skilled in the art to utilize a crystallization temperature of about 90°C or less as set forth in new process claim 19. Since applicant has demonstrated that zeolite beta crystallized at 99°C produces crystals outside the scope of those claimed, the logical presumption is that Calvert et al. never made crystals within the scope of the instant claims or ever sought to make such crystals.

Claims 8 and 9 were further rejected under 35 U.S.C. 103 as obvious over Calvert et al. This rejection also is inappropriate for the reasons given above. Also, Calvert et al. uses colloidal silica in all examples and does not use the more soluble form, silicic acid which is hydrated SiO_2 , even though its use is broadly suggested, among others, at col. 2, line 63.

Claims 1-6 and 10-12 were also rejected under 35 U.S.C. 103 as unpatentable over Argauer et al. (U.S. Patent 3,702,886). This grounds for rejection is also respectfully traversed.

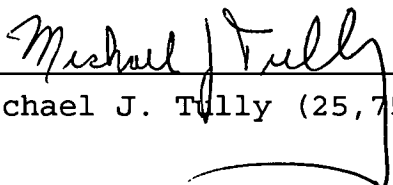
Argauer teaches the preparation of a ZSM-5 type zeolite by crystallizing a synthesis mixture comprising a source of silica, an N-tetrapropylammonium hydroxide and a source of alumina. Crystallization temperatures employed may range from 100°C to 175°C (col. 5, line 61) with more preferred temperatures of 150°C to 175°C being recited (Col. 5, lines 63-64). It is noted that in all examples, crystallization temperatures of at least 125°C are used.

Once again, Applicant has shown in Example 1 that crystallization of ZSM-5 type zeolite at a temperature of 120°C gives rise to crystals having a crystal size well over 100 nm and a larger particle size distribution than set forth in the instant claims - Note Fig. 2 and Fig. 3.

Thus, Argauer, like Calvert et al., does not disclose a process responding to the instant claims and does not teach the preparation of crystals having a size dimension as set forth in the instant claims.

For the above reasons, it is believed that claims 1-3 and 5-27 are all now in condition for allowance which action is earnestly solicited.

Respectfully submitted,


Michael J. Tully (25,755)

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Perman & Green
425 Post Road
Fairfield, CT 06430
203-259-1800

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